

In the Claims

1. (Currently Amended): A multi-layer tube, comprising:

a metal tube having an outer surface;

a zinc layer bonded to the metal tube outer surface wherein the zinc layer is selected from the group consisting of zinc plating, zinc nickel alloys, zinc cobalt alloys, zinc aluminum alloys, and mixtures thereof;

a surface treatment layer bonded to the zinc layer, wherein the surface treatment layer is selected from the group consisting of a zinc/aluminum/rare earth alloy, phosphate, chromate, and mixtures thereof;

a phenolic coating capable of spray application, wherein the phenolic coating contains phenols having at least one substituted group "R", wherein R consists of H, and OH;

a first polymeric layer bonded to the phenolic coating, wherein the first polymeric layer is selected from the group consisting of melt-processible thermoplastic elastomers, melt-processible ionomers, melt-processible nylons, melt-processible fluoropolymers, and mixtures thereof; and

a second polymeric layer bonded to the first polymeric layer, wherein the second polymeric layer is selected from the group consisting of melt-processible nylons, melt-processible thermoplastic elastomers, melt-processible fluoropolymers, and mixtures thereof.

32. (Cancelled).

33. (Previously Amended): The multi-layer tube of claim 32 1, wherein the priming layer phenolic coating comprises carbolic acid.

34. (Previously Presented): The multi-layer tube of claim 1, wherein the first polymeric layer consists essentially of an ionomer and a nylon.

35. (Cancelled).

36. (Previously Amended): The multi-layer tube of claim 34, wherein the priming layer comprises carbolic acid.

37. (Previously Presented): The multi-layer tube of claim 36, wherein the ionomer of the first polymeric layer is ethylene methacrylic acid copolymer-partial metal salt, and the nylon of the first polymeric layer is Nylon 12.

38. (Previously Presented): The multi-layer tube of claim 37, wherein the ethylene methacrylic acid copolymer-partial metal salt comprises from about 10% to about 70% of the first polymeric layer, and wherein the Nylon 12 comprises from about 90% to about 30% of the first polymeric layer.

39. (Previously Presented): The multi-layer tube of claim 38, wherein the Nylon 12 is characterized by a low viscosity and low molecular weight.

40. (Previously Presented): The multi-layer tube of claim 1, wherein the zinc/aluminum/rare earth alloy of the surface treatment layer consists essentially of from about 85% to about 97% Zn, from about 3% to about 15% Al, and at least 5 ppm of a rare earth-containing alloy.

41. (Previously Presented): The multi-layer tube of claim 40, wherein the surface treatment layer has a weight in the range of from about 37.3 g/m² to about 97.7 g/m².

42. (Cancelled).

43. (Previously Presented): The multi-layer tube of claim 32, wherein the priming layer comprises carbolic acid.

44. (Previously Presented): The multi-layer tube of claim 1, wherein the zinc layer has a thickness in the range of from about 10 μ to about 25 μ .

45. (Previously Presented): The multi-layer tube of claim 1, wherein the second polymeric layer consists essentially of a nylon.

46. (Previously Presented): The multi-layer tube of claim 45, wherein the nylon is Nylon 12.

47. (Previously Presented): The multi-layer tube of claim 46, wherein the Nylon 12 is characterized by a low viscosity and low molecular weight.

48. (Previously Presented): The multi-layer tube of claim 1, wherein the first polymeric layer and the second polymeric layer have a combined thickness in the range of from about 75μ to about 300μ .

49. (Previously Presented): The multi-layer tube of claim 48, wherein the first polymeric layer and the second polymeric layer have a combined thickness in the range of from about 125μ to about 250μ .

50. (Currently amended): A multi-layer tube, comprising:

a metal tube having an outer surface;

a zinc layer bonded to the metal tube outer surface wherein the zinc layer is selected from the group consisting of zinc plating, zinc nickel alloys, zinc cobalt alloys, zinc aluminum alloys, and mixtures thereof;

a surface treatment layer bonded to the zinc layer, wherein the surface treatment layer is selected from the group consisting of a zinc/aluminum/rare earth alloy, phosphate, chromate, and mixtures thereof;

a priming layer comprising one or more phenols, wherein the priming layer is present in a thickness obtained by spray coating;

a first polymeric layer bonded to the priming layer, wherein the first polymeric layer is selected from the group consisting of melt-processible thermoplastic elastomers, melt-processible ionomers, melt-processible nylons, melt-processible fluoropolymers, and mixtures thereof; and

a second polymeric layer bonded to the first polymeric layer, wherein the second polymeric layer is selected from the group consisting of melt-processible nylons, melt-processible thermoplastic elastomers, melt-processible fluoropolymers, and mixtures thereof.

51. (Previously Presented): The multi-layer tube of claim 50, wherein the priming layer comprises carbolic acid.

52. (Previously Presented): The multi-layer tube of claim 51, wherein the ionomer of the first polymeric layer is ethylene methacrylic acid copolymer-partial metal salt, and the nylon of the first polymeric layer is Nylon 12.

53. (Previously Presented): The multi-layer tube of claim 52, wherein the zinc/aluminum/rare earth alloy of the surface treatment layer consists essentially of from about 85% to about 97% Zn, from about 3% to about 15% Al, and at least 5 ppm of a rare earth-containing alloy.

54. (Previously Presented): The multi-layer tube of claim 53, wherein the ethylene methacrylic acid copolymer-partial metal salt comprises from about 10% to about 70% of the first polymeric layer, and wherein the Nylon 12 comprises from about 90% to about 30% of the first polymeric layer.

55. (Previously Presented): The multi-layer tube of claim 54, wherein the surface treatment layer has a weight in the range of from about 37.3 g/m² to about 97.7 g/m².

56. (Previously Presented): The multi-layer tube of claim 55, wherein the second polymeric layer consists essentially of a nylon.

57. (Previously Presented): The multi-layer tube of claim 56, wherein the nylon is Nylon 12.

58. (Previously Presented): The multi-layer tube of claim 57, wherein the Nylon 12 is characterized by a low viscosity and low molecular weight.

59. (Previously Presented): The multi-layer tube of claim 58, wherein the first polymeric layer and the second polymeric layer have a combined thickness in the range of from about 125 μ to about 250 μ .

60. (Previously Presented): The multi-layer tube of claim 59, wherein the first polymeric layer and the second polymeric layer have a combined thickness in the range of from about 75 μ to about 300 μ .

61. (Previously Presented): The multi-layer tube of claim 60, wherein the zinc layer has a thickness in the range of from about 10 μ to about 25 μ .